AREA 1 PHASE II
PRE-DESIGN INVESTIGATION SURVEY
PROJECT SPECIFIC PLAN

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO

AUGUST 1997

U.S. DEPARTMENT OF ENERGY
FERNALD AREA OFFICE

20710-PSP-0003
Revision 0

ORIGINAL

1136

VARIANCE / FIELD CHANGE NOTICE

V/F No. 50.03.59.06-1

PROJECT TITLE: A1PII Pre-Design Investigation Survey (Rev. 0) 20710-PSP-0003

Date: 9/18/97

VARIANCE / FIELD CHANGE NOTICE (Include justification):

This variance modifies the sample identification system for the physical samples collected for total uranium analyses at the HPGe measurement locations identified in section 2.3.2 of the PSP, and modifies the sample collection container requirements.

1-The proper sample ID system should be:
A1P2 - INV (investigative sample) - sample location (acre number) - sequential number for number of samples in the acre - depth interval code, analytical suite - QC

where: sample location = the acre or area of sampling in the East Field of A1P2 (1, 2, 3, etc.)
sequential number = the number of samples collected in the area or acre (1, 2, 3, etc.)
depth interval code = 0-6" is represented by 1, 6"-12" is 2, and so on
analytical suite = R is radiological
QC = "D" is duplicate, "X" is rinsate

Example: A1P2-INV-131-1-1R-D is for the duplicate of the first sample collected in acre or area 131 at depth interval 1 (0-6"). Sample receiving will determine if the sample will be analyzed on or off-site, depending on the on-site lab capacity.

2-Additionally, the sample container to be used for surface soil sampling will be a capped plastic or stailess steel liner/tube. A rinsate sample will be collected for every 20 samples only if an auger or geoprobe is used and field decontamination occurrs to collect the sample.

Justification:

1-The above sampling nomenclature is consistent with recent PSPs developed and implemented for A2PI and A1P2. The sampling numbering system in the PSP (Section 2.3.2) contained too many characters to accomodate up to 140 acres in the numbering system and still remain under 20 characters. The A1PII had to be shortened to A1P2,and the dash between the depth interval and the analytical suite removed. In addition the depth interval increments were corrected from 1 = 1', 2 = 2' and 3 = 3' to 1 = 0-6", 2 = 6"-12", 3 = 12"18" and so on.

2-The sample container to be used will be based on sampling efficiency. The PSP in Section 2.3.1 required the samples to be collected using a 1 to 2" diameter plastic or stainless steel liner only using a manual hand auger.

REQUESTED BY: Mike Frank Date: September 22, 1997

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE	9-22-97	X	PROJECT MANAGER	9/22/97
	DATA QUALITY MANAGEMENT		X	SCEP SAMPLING & CHARACTERIZATION	9/22/97
X	ANALYTICAL CUSTOMER SUPPORT RCS FOR WCW	9/22/97		OTHER	9/22/97
	OTHER			OTHER STEVE GARLAND	

VARIANCE/FCN APPROVED [X]YES [ ]NO

REVISION REQUIRED: [ ]YES [x]NO

DISTRIBUTION

PROJECT MANAGER:	DOCUMENT CONTROL: Michelle Tudor	OTHER:
QUALITY ASSURANCE:	OTHER:	OTHER:
FIELD MANAGER:	OTHER:	OTHER:

000002

VARIANCE / FIELD CHANGE NOTICE

V/F No. 60.03.59.08-2

PROJECT TITLE: A1PII Pre-Design Investigation Survey (Rev. 0)

Date: 9/23/97

VARIANCE / FIELD CHANGE NOTICE (Include Justification): 20710-PSP-0003

Variance:

This variance removes the requirement to plug surface physical sample holes (0-6") with bentonite pellets (Section 2.3.1, Pg 8). The requirement remains as stated in the PSP for subsurface holes. The 0-6" (2" holes) surface holes wil be filled with excess sample material, if any.

Justification: Recent onsite laboratory analysis of a bentonite sample has been found to contain several radiological constituents of concern:
U-238 3.6 pCi/g
Th-232 2.5 pCi/g
Ra-226 2.0 pCi/g
U-235 .21 pCi/g
K-40 5.1 pCi/g

Since sampling will be occuring in part of the A1P2 East Field prior to RTRAK and HPGe readings being completed it is necessary to ensure no radiological constitutents have been added to the soils which could be identified by the real-time screening equipment as potential contamination.

ORIGINAL

REQUESTED BY: Joan White J H White Date: September 23, 1997

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE R Quirke		X	PROJECT MANAGER	9/23/97
	DATA QUALITY MANAGEMENT		X	SCEP SAMPLING & CHARACTERIZ. MGR. Joan H White	9/23/97
N/A	ANALYTICAL CUSTOMER SUPPORT			OTHER	9/23/97
	OTHER			OTHER	

VARIANCE/FCN APPROVED [X]YES [ ]NO

REVISION REQUIRED: [ ]YES [x]NO

DISTRIBUTION

PROJECT MANAGER:	DOCUMENT CONTROL: Michelle Tudor	OTHER:
QUALITY ASSURANCE:	OTHER:	OTHER:
FIELD MANAGER:	OTHER:	OTHER:

VARIANCE / FIELD CHANGE NOTICE

V/F 50.03.59.06-3

WBS NO.: 50.03.59.06

PROJECT TITLE: Area I Phase II Pre-Design Investigation 20710-PSP-0003

Date: 9/24/97

VARIANCE / FIELD CHANGE NOTICE (Include justification):

Field Change Notices:

1. Physical Sample Frequency

This variance is to change the requirement as stated in Section 2.3.1 Sample Collection. The current requirement is to collect physical samples at a frequency of 1 for every 2 HPGe measurements, which correlates to one per every two acres. This requirement is being changed to 1 per every acre only within the proposed Borrow Area and Sedimentation Basin and contiguous areas on the east side of the Access Road, and the Outlet Works Area on the west side of the Access Road.

Per the attached map, physical samples shall be collected at a frequency of one per acre for the areas labeled: 1 through 82, and 133 through 140.

Justification:

The current schedule for starting certification (without any remedial activities) of the Borrow Area, Sedimentation Basin and outlet works area is spring of 1998. While it is anticipated that remedial action will not be necessary, additional data is needed to ensure that the area will pass certification. Physical samples will be collected to provide additional confidence in the pre-design modeling.

2. Addition to the Survey Area

The areas noted in the attached figure as 137 through 140 is now included in the scope of this PSP.

Justification:

This area will receive drainage from Area 1, Phase II.

ORIGINAL

Attached to this variance is:

Figure 1: Plat showing the Borrow Area, Sediment Basing Area and Outlet Works Areas in relationship to the site

Figure 2: Plat showing the A1PII Block Numbering System

Work performed under this variance will include the variance number on the Field Activity Log.

REQUESTED BY: Alex Duarte Date: 9/24/97

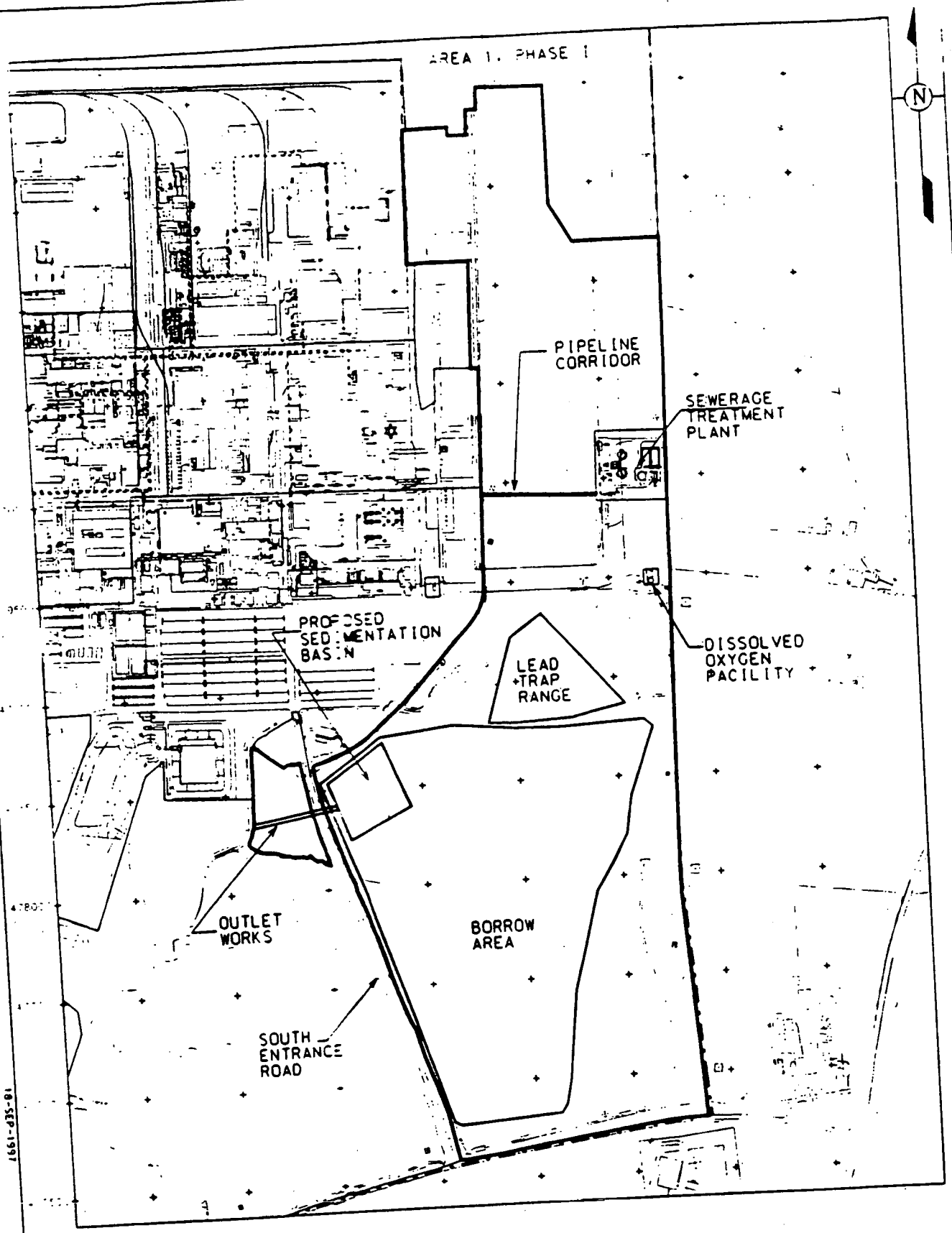
X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE	9-25-97	X	PROJECT MANAGER	9/25/97
	DATA QUALITY MANAGEMENT		X	Characterization Lead	9/25/97
	ANALYTICAL CUSTOMER SUPPORT		X	Characterization and Sampling Mgr.	9/25/97
	OTHER			OTHER	

VARIANCE/FCN APPROVED [X]YES [ ]NO

REVISION REQUIRED: [ ]YES [x]NO

DISTRIBUTION

PROJECT MANAGER:	DOCUMENT CONTROL: Esther Dittmer	OTHER:
QUALITY ASSURANCE:	OTHER:	OTHER:
FIELD MANAGER:	OTHER:	OTHER:



LEGEND:

-·-·- TEMP BOUNDARY

SCALE

700 350 0 700 FEET

DRAFT

FIGURE 1. AREA1, PHASE II

Variance 50.03.59.06-1

4/24/92

000003

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PG 3

000003

1349000 1349500 1350000 1350500 1351000 1351500 1352000 1352500

482000 481500 481000 480500 480000 479500 479000 478500 478000 477500 477000 476500 476000

STATE PLANAR COORDINATE SYSTEM 1983

3

4B

4A

5

1

2

				132	131	
125	126	127	128	129	130	
124	123	122	121	120	119	
	114	115	116	117	118	
	113	112	111	110	109	
	104	105	106	107	108	
	103	102	101	100	99	
	94	95	96	97	98	
	93	92	91	90	89	
83	84	85	86	87	88	
	82	81	80	79	78	77	76
140	67	68	69	70	71	72	73	74	75
139	66	65	64	63	62	61	60	59	58
138	49	50	51	52	53	54	55	56	57
137	48	47	46	45	44	43	42	41	136
		34	35	36	37	38	39	40	135
	33	32	31	30	29	28	27	134
		21	22	23	24	25	26	133
		20	19	18	17	16	15	14
	7	8	9	10	11	12	13	
		6	5	4	3	2	1	

Outlet Works Area

Sediment Basin + Borrow Area

LEGEND:

FEMP BOUNDARY

PHASE BOUNDARY WITHIN A REMEDIATION AREA

REMEDIATION AREA BOUNDARY

SCALE

500 250 0 500 FEET

DRAFT

Figure 2 AREA 1, PHASE II BLOCK NUMBERING SYSTEM

Variance 50.03.59.06-1

9/24/97

24

VARIANCE / FIELD CHANGE NOTICE

V/F 50.03.59.06-4

WBS NO.: 50.03.59.06

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PROJECT TITLE: Area I Phase II Pre-Design Investigation 20710-PSP-0003

Date: 9/24/97

VARIANCE / FIELD CHANGE NOTICE (Include justification):

Field Change Notices:

Section 2.2 of the PSP does not identify the HPGe pattern needed to obtain approximately 91% coverage of an area. The pattern required to cover an area of ground approximately one acre in size (209' X 209'), using a one meter detector height, consists of 33 concentric circles in a triangular pattern. The distance between the center points of 3 the adjacent circles is 42' (see Figure 1 attached). A reading will be taken at the center of each circle, a stake place and location surveying performed prior to or after the HPGe reading has occurred.

Attachment: Figure 1, Plat Showing the Grid Geometry using a 1 meter HPGe Read Over an Acre Area.

Work performed under this variance will include the variance number on the Field Activity Log.

Justification:

This approximate 91% HPGe coverage is necessary in areas where the RTRAK cannot access an area and the HPGe must be used to obtain the coverage.

ORIGINAL

REQUESTED BY: Alex Duarte Date: 9/24/97

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE	9-25-97	X	PROJECT MANAGER	9/25/97
	DATA QUALITY MANAGEMENT		X	Characterization Lead	9/24/97
	ANALYTICAL CUSTOMER SUPPORT		X	Characterization and Sampling Mgr.	
	OTHER			OTHER	9/25/97

VARIANCE/FCN APPROVED [X]YES [ ]NO

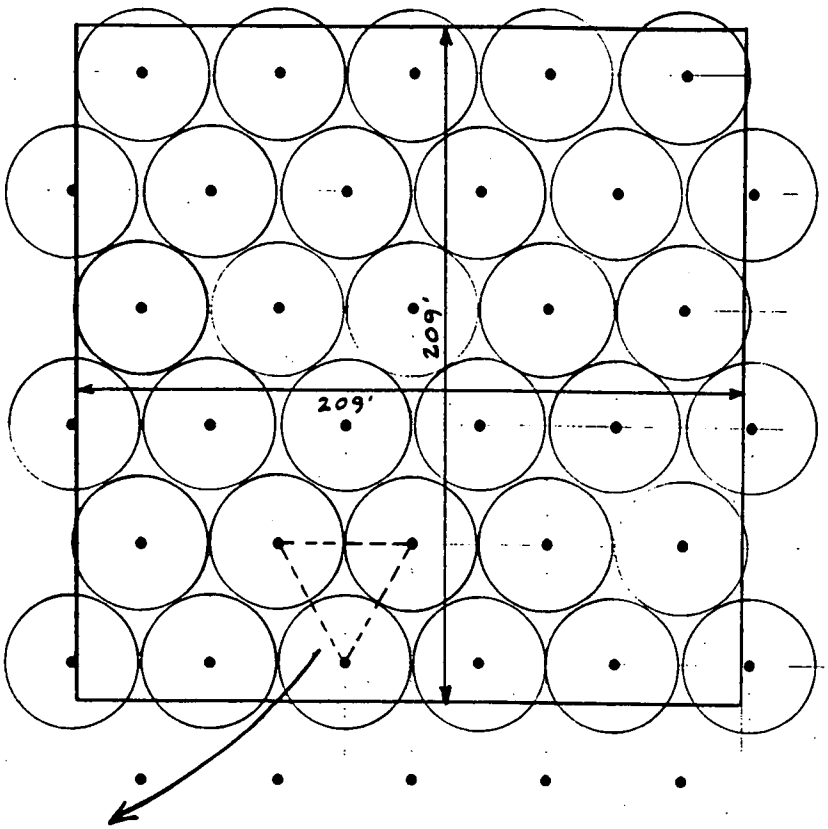
REVISION REQUIRED: [ ]YES [x]NO

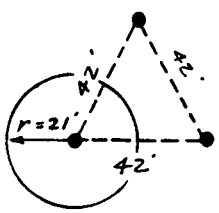
DISTRIBUTION

PROJECT MANAGER:	DOCUMENT CONTROL: Esther Dittmer	OTHER:
QUALITY ASSURANCE:	OTHER:	OTHER:
-FIELD MANAGER:	OTHER:	OTHER:

GRID GEOMETRY USING A
1 METER HPGC READ OVER
AN ACRE AREA

1:60





Variance, PSP 50.03.59.06-4
Area I Phase II Pre-Design Investig.
9/24/97

1136

VARIANCE / FIELD CHANGE NOTICE

V/F 50.03.59.06-5

WBS NO.: 50.03.59.06

Page 1 of 1

PROJECT TITLE: Area I Phase II Pre-Design Investigation 20710-PSP-0003

Date: 9/29/97

VARIANCE / FIELD CHANGE NOTICE (Include justification):

Field Change Notices:

The PSP calls for near 100% RTRAK coverage (Section 2.1), HPGe readings (Section 2.2.2) and physical samples (Section 2.3.1) to be collected in each acre block. This variance removes the requirement to collect RTRAK, HPGe readings and physical samples (0-6") from acre blocks 107, 108, 109, 110, 124, 125, 126, 127, 131, and 132.

Justification:

Acres 124, 125, 126, 127, 131, and 132 in the northern portion of A1P2 are currently inaccessible to RTRAK, HPGe and physical sampling due to the presence of soil piles and lay down areas. This variance removes the requirement to collect RTRAK, HPGe and physical samples from the PSP in these areas at this time. If the areas become accesssible (cleared), the data collection may proceed. In addition portions of 128, 129, and 130 may not be accessible and may not receive 100% coverage with the RTRAK.

Acres 107, 108, 109 and 110 are located in the STP and will not require RTRAK, HPGe and physical samples to be collected. The STP area is being extensively sampled under other PSPs, therefore no additional data is required. This variance removes the requirement to collect RTRAK, HPGe and physical samples from the PSP in these areas.

REQUESTED BY: Alex Duarte Date: 9/29/97

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE	9-29-97	X	PROJECT MANAGER for STB	9/29/97
	DATA QUALITY MANAGEMENT		X	Characterization Lead	9/29/97
	ANALYTICAL CUSTOMER SUPPORT		X	Characterization and Sampling Mgr	9/29/97
	OTHER			OTHER for Mike Frank	

VARIANCE/FCN APPROVED [X]YES [ ]NO

REVISION REQUIRED: [ ]YES [x]NO

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PROJECT MANAGER:	DOCUMENT CONTROL: Esther Dittmer	OTHER:
QUALITY ASSURANCE:	OTHER:	OTHER:
-FIELD MANAGER:	OTHER:	OTHER:

ORIGINAL

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VARIANCE / FIELD CHANGE NOTICE

V/F 50.03.59.06-6

WBS NO.: 50.03.59.06

PROJECT TITLE: Area I Phase II Pre-Design Investigation 20710-PSP-0003

Date: 10/6/97

VARIANCE / FIELD CHANGE NOTICE (Include justification):

Field Change Notices:

1-Collect one 6" soil sample from undisturbed native soils in Acres 123, 124, 125, 126, 127, 131, 132, 141 - 156, as accessible. The sample can be collected at any accessible location anywhere in the acre. If a gravel pad is present in the area, the geologist must ensure the sample is collected from the UNDISTURBED NATIVE SOIL below the gravel, below the soil/gravel interface and below the reworked soil. If the location is adjacent to a soil pile, the geologist must ensure the soil is collected from the UNDISTURBED NATIVE SOIL below the loose surface soil and below any reworked soil. A lithologic log will be completed for each boring and the samples may be collected with either a geoprobe or a hand auger. The QC samples, analytical methods and ASL levels remain consistent with Section 2.3 Physical Soil Sampling in the PSP.

2-The depth of the top of the 6" soil sample will be indicated in the sample number with a 1 for 0-6", a 2 for 6"-12", a 3 for 12"-18", a 4 for 18"-24", a 5 for 24"-30" and a 6 for 30"-36". For example: if a 6" soil sample is collected below a gravel pad consisting of 14" of gravel, and 4" of disturbed soil, then the top of the soil sample is at 18" or level 4. Penetration permits for up to 3' may be required to get undisturbed native soil. The depth indicator in the sample number will vary from Section 2.3.2 in the PSP. For example the duplicate of the first sample in an acre from depth interval 2 (6"-12") sample from location 132 will be A1PII-INV-132-1-2-R-D where: 132 = the acre number
1 = the first location in the acre
2 = the second depth interval (6'-12")
R = Rad analysis
D = duplicate sample
This numbering system will apply for all samples collected from this date on regardless of if they are surface or subsurface samples, as described in Section 2.3.1 Sample Collection.

Justification:

1-The PSP originally called for 100% RTRAK coverage and one HPGe reading per acre and one physical sample (0-6") per every other acre to be collected from A1PII. Variance 50.03.59.06-5 identified that Acres 107, 108, 109, 110, 124, 125, 126, 127, 131, and 132 were not accessible due to the location of soil piles and trailers, and removed the requirement to collect RTRAK, HPGe and samples in these acres. Acre 123 also did not have a sample collected from it because of inaccessibility.

It has subsequently been requested to get one physical sample comprised of 6" of native undisturbed soil per Acre in as many of Acres 123-127,131,132,141-156 as possible.

2-The PSP in Sections 2.3.1 Sample Collection and 2.3.2 Physical Sample Identification, originally identified the depth of the sample to be indicated as 1 = 1 foot deep, 2 = 2 feet deep, 3 = 3 feet deep. This system will not fit if a sample is from a 6" interval from, for example, 6"-12", so it is being modified.

ORIGINAL

STG

REQUESTED BY: Steve Garland Date: 10/6/97

RA

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE K Durfee	10-8-97	X	PROJECT MANAGER S.T. Gard	10-8-97
	DATA QUALITY MANAGEMENT		X	Characterization A. Brooks by STG	10-8-97
	ANALYTICAL CUSTOMER SUPPORT		X	Characterization and Sampling M. Hibbs	10-8-9
	OTHER		X	EM Manager Mike Fa	10-8-97

VARIANCE/FCN APPROVED [X]YES [ ]NO

REVISION REQUIRED: [ ]YES [x]NO

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QUALITY ASSURANCE:	OTHER:	OTHER:
-FIELD MANAGER:	OTHER:	OTHER:

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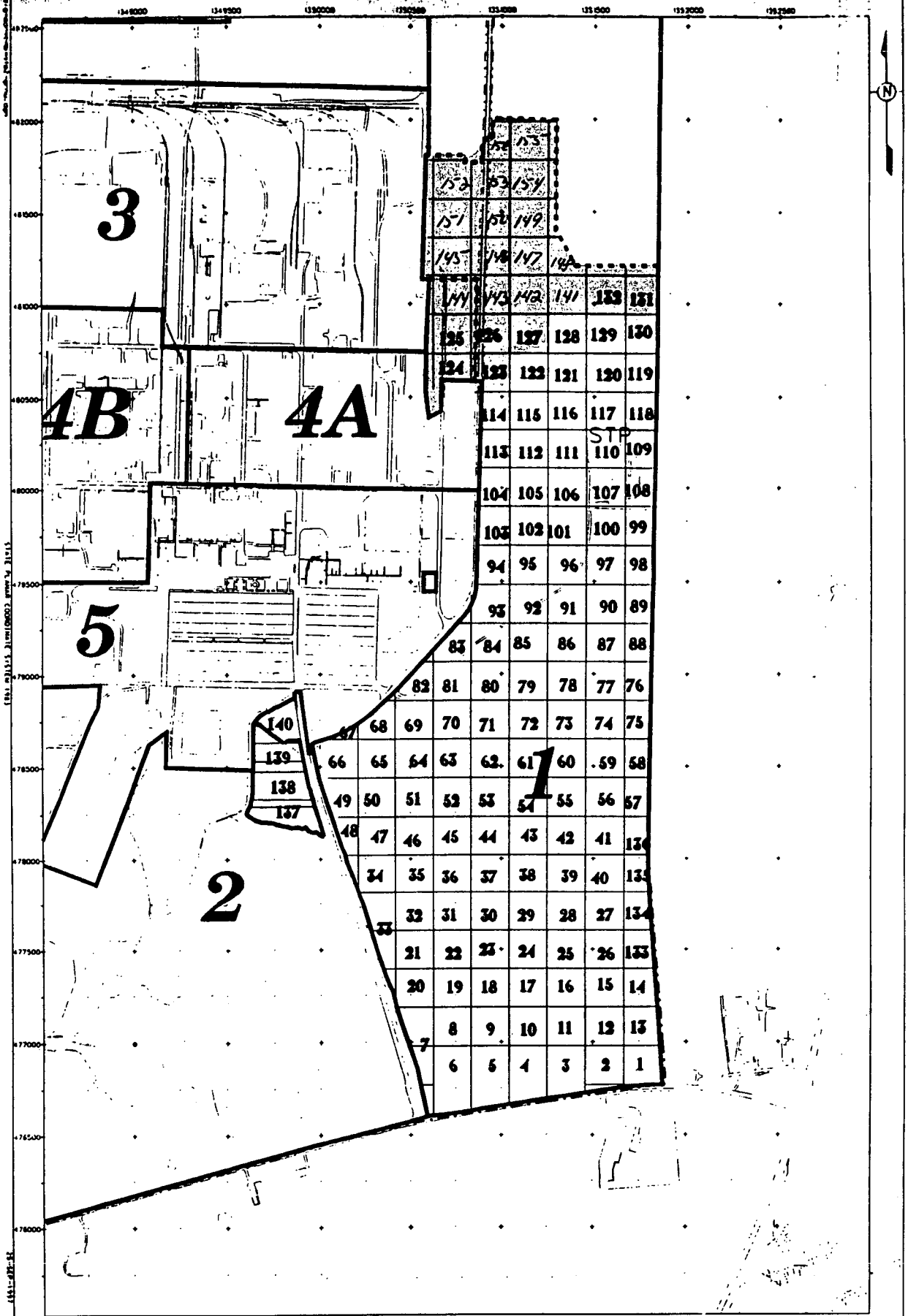

AREA 1, PHASE II BLOCK NUMBERING SYSTEM Variance 50.03,5906-6

10/6/97

PROJECT SPECIFIC PLAN

AREA 1 PHASE II PRE-DESIGN INVESTIGATION SURVEY

Project Number: 50.03.59.06

Revision: 0

Prepared by: Fluor Daniel Fernald

Prepared for: U.S. Department of Energy

Fernald Field Office

Under Contract DE-AC05-92OR21972

APPROVAL:

Clifton Blanchard for — 8/27/97

Steve Garland, A1PII Project Manager — Date
Soil Characterization Excavation Project

AR Duarte — 8/27/97

Alex Duarte, A1PII Characterization Lead — Date
Soil Characterization Excavation Project

Joan White — 8-27-97

Joan White, Characterization & Sampling Manager — Date
Soil Characterization Excavation Project

Reinhard Friske — 8-27-97

Reinhard Friske, Quality Assurance — Date
Soil Characterization Excavation Project

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LIST OF APPENDICES

LIST OF ACRONYMS AND ABBREVIATIONS

A1PII	Area 1 Phase II
ALARA	As Low As Reasonably Achievable
ASCOC	Area Specific Constituent Of Concern
ASL	Analytical Support Level
AWWT	Advanced Wastewater Treatment
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
DQO	Data Quality Objective
FAL	Field Activity Log
FEMP	Fernald Environmental Management Project
FRL	Final Remediation Level
GIS	Geographical Information System
GPS	Global Positioning System
HPGe	High Purity Germanium
NaI	Sodium Iodide
OSDF	On- Site Disposal Facility
ppm	parts per million
PWID	Project Waste Identification Document
RI/FS	Remedial Investigation/Feasibility Study
RSS	Radiation Scanning System
RTRAK	Radiation Tracking System
SCEP	Soils Characterization and Excavation Project
SCQ	Sitewide CERCLA Quality Assurance Project Plan
SEP	Sitewide Excavation Plan
SMMP	Soils and Miscellaneous Media Projects
STP	Sewage Treatment Plant
WAC	Waste Acceptance Criteria
WDSS	Waste Disposition Support Services

1.0 INTRODUCTION

1.1 DESCRIPTION

This Project Specific Plan (PSP) describes the data collection activities necessary to support remedial design soil excavation for Area 1 Phase II (A1PII). The data collected under this PSP will be used to determine soil areas requiring excavation due to total uranium and other primary radiological Constituent Of Concern (COC) contamination. The data collected under this PSP will also be used to assist with the determination Waste Acceptance Criteria (WAC) in areas to be excavated.

The investigation will consist of a combination of scanning surveys and physical sampling. Scanning surveys will be conducted with large-volume Sodium Iodide (NaI) or HPGe detectors and will cover, to the extent possible, 100 percent of the area. The scan data will be evaluated to assess general patterns of contamination for total uranium as well as to point out areas potentially exceeding the WAC and FRL for total uranium. This information will bias HPGe and physical sampling. The resulting area-wide radiological activity pattern will be plotted using scanning results and the Geographic Information System (GIS). HPGe measurements will be taken in areas with elevated uranium contamination and in areas below the detection capabilities of the NaI. Physical samples will be taken for laboratory analysis of total uranium to confirm HPGe results. If the surface physical samples indicate total uranium above the FRL, additional soil samples will be collected in one foot intervals until an interval below the FRL is reached.

1.2 BACKGROUND

Area 1 Phase II encompasses a large portion of the East Field including the On-Site Disposal Facility (OSDF) footprint, the Sewage Treatment Plant (STP) and OSDF borrow area. A1PII is bounded on the north by A1PI, the east by the FEMP property line fence, the west by the former production area and Southern Entrance Road, and the south by Willey Road. The Trap Range, contaminated with lead shot, lies within the OSDF borrow area.

The soils beneath staged soil piles generated during excavation of A1PI and sediment basins existing in A1PI are excluded from this PSP.

The investigation area is shown in Figure 1-1.

1.3 PURPOSE AND GOALS

The purpose of this Area 1 Phase II Pre-design Investigation Survey Project Specific Plan is to collect data for the determination of surface soil areas within the boundaries of A1PII requiring excavation prior to remedial design activities and for the delineation of areas potentially exceeding WAC.

The specific goals of this plan are to:

1) Determine general patterns of contamination.

2) Provide data to better define excavation areas potentially exceeding the FRL for total uranium.

2) Determine locations of material in areas to be excavated that are potentially above WAC.

3) Document how the utilization of RTRAK, HPGe, and physical sampling supports work to be performed in A1PII as outlined in the *RTRAK Applicability Study*, 20701-RP-0003, *Comparability of In-Situ Gamma Spectrometry and Laboratory Data*, 20701-RP-0001, and the *Sitewide Excavation Plan*, 2500-WP-0028 Rev. C Draft.

Physical sampling and analysis activities will be consistent with the Sitewide Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Quality Assurance Project Plan (SCQ), and Data Quality Objectives (DQO) SL-047 (Appendix A).

1.4 SCOPE

This PSP defines the data collection necessary for the determination of soil areas within the boundaries of A1PII requiring remedial excavation. Based on analysis of the RI/FS data, total uranium is expected to envelope all ASCOCs with the exception of Technetium-99. Radiological scanning using NaI detectors, direct measurements with HPGe detectors, physical sampling, surface soil moisture and density measurements, and land surveying will be used to characterize soil for total uranium. Additionally, field radiological surveys will be conducted on surface soils; soil samples will be collected for total uranium analysis to ASL B at the FEMP on-site laboratory with QC samples analyzed to ASL D at both on and off-site laboratories.

The investigation will be performed in three phases. The first phase will involve scanning using NaI detector systems. Areal coverage will be 100 percent to the extent possible. The data collected from this scan will be reviewed to drive decisions in the second phase of the investigation. Total uranium concentration values of (66 ppm) and (800 ppm) will be used as decision drivers for second phase investigation activities. The use of these RTRAK data trigger levels ensures that the actual soil concentrations do not exceed the FRL and WAC values respectively to the 95% confidence level.

The second phase will require use of HPGe instrumentation to measure surface soils applying an acre grid pattern. In areas exceeding the (66 ppm) decision level as measured by NaI detectors, representative HPGe measurements will be performed using the sample pattern of Figure 2-1. A minimum of five (5) non-overlapping measurements will be taken in each acre grid. HPGe measurements will determine if areas exceeding 66 ppm delineated in Phase I of this plan do in fact exceed the total uranium FRL of 82 ppm.

In areas where NaI measurements indicate that uranium contamination is below 66 ppm, representative measurements using HPGe detectors will be taken to verify that surface soils are actually below 66 ppm. These areas will be divided into acre grids. A minimum of one (1) HPGe measurement will be taken in each acre grid.

In areas exceeding a NaI measurement result of 800 ppm total uranium, HPGe measurements will be taken to verify the potential of the areas to exceed WAC for total uranium. The detector height and the grid pattern will be designed by the Characterization Lead and will be dependant on the scale of each area to be characterized that exceeds 800 ppm.

The third phase will consist of physical sampling as a final confirmation of HPGe results. Physical samples will be taken at a frequency of one (1) for every two (2) HPGe measurements in areas below the 66 ppm trigger level and one for every HPGe measurement in areas above the 66 ppm trigger. Sampling will occur after HPGe measurements are made. These samples will be analyzed at the onsite laboratory for total uranium by Bromo-PADAP or ICP-MS at ASL B. Quality control samples will be taken one per 10 samples and analyzed by both on and off-site laboratories by Alpha Spectroscopy to ASL D.

1.5 METHODOLOGY

Sampling and analytical methods will be consistent with the FEMP Sitewide CERCLA Quality Assurance Project Plan (SCQ) and project-specific data quality objectives (DQOs).

Field radiological scan surveys will be completed using the Radiation Tracking System (RTRAK) or Radiation Scanning System (RSS) NaI detectors. Operation of the RTRAK will be in accordance with procedure EQT-30, *Operation of Radiation Tracking Vehicle Sodium Iodide Detection System.*

In areas where RTRAK cannot access, the RSS will be used to perform surface soil scanning. The configuration of the RSS will be equivalent to the RTRAK. Operation of the RSS system will be in accordance with procedure EQT-23, *Operation of ADCAM Series Analyzers With Gamma Sensitive Detectors.*

HPGe detectors will be used to characterize areas as defined in Section 1.4. Operation of HPGe detector systems will be in accordance with procedure EQT-23, *Operation of ADCAM Series Analyzers With Gamma Sensitive Detectors.*

Moisture/density measurements taken in conjunction with each HPGe measurement will be performed in accordance with procedure EQT-32 *Troxler 3440 Series Surface Moisture/Density Gauge - Calibration, Operation, and Maintenance.*

System calibration activities for HPGe and NaI detectors/analyzers is performed in accordance with procedure EQT-22, *Characterization Of Gamma Sensitive Detectors.*

The A1PII physical soil sampling will be conducted by manual hand-auger or core liner in accordance with SMPL-01, *Solids Sampling.*

1.6 KEY PROJECT PERSONNEL

Key project team members responsible for conducting work in accordance with this PSP come from the Soils Characterization and Excavation Project (SCEP), the Soils and Miscellaneous Media Projects (SMMP), Safety and Health (SH), Quality Assurance, (QA), Information Systems (IS), the FEMP Laboratory, and the DOE. See Table 1-1.

TABLE 1-1
KEY PROJECT PERSONNEL

TITLE	PRIMARY	ALTERNATE
DOE Contact	Kathy Nichel	Rob Janke
A1PII Project Manager	Steve Garland (SCEP)	Cliff Blanchard (SCEP)
Characterization & Sampling Manager	Joan White (SCEP)	Mike Frank (SMMP)
Characterization Lead	Alex Duarte (SCEP)	Joan White (SCEP)
Project Coordinator	Dale Seiller (SCEP)	Mike Heinen (SCEP)
Quality Assurance Contact	Reinhard Friske (QA)	Harold Swiger (QA)
Data Management Contact	Jeff Maple (SCEP)	Susan Marsh (IS)
Health & Safety Contact	Jack Patrick (SH)	Lew Wiedeman (SH)
Laboratory Contact	Bill Westerman (Lab)	Jenny Vance (Lab)
Analytical Lead	Al Bacon (SCEP)	Alex Duarte (SCEP)
Waste Disposition	Susan Lorenz (WAO)	Ken Belgrave (WAO)

2.0 FIELD INVESTIGATION

2.1 NaI DETECTOR MEASUREMENTS (PHASE 1)

Total uranium surveying will consist of 100 percentage areal coverage using real-time screening with gamma sensitive NaI detector systems. Real-time detector system coverage will be limited to the surface soil and will be as extensive as possible without jeopardizing worker safety or destroying root systems of trees and shrubs in the areas.

The NaI detector acquisition time will be set to four (4) seconds, and data will be collected at a speed of 1.0 mile per hour. RTRAK will be the primary tool used to collect the scan data. The onboard Global Positioning System (GPS) will be used to store positioning information with each acquisition file.

In areas that the RTRAK cannot access, HPGe detectors or the RSS (if current testing shows comparability with RTRAK) will be used to perform surface soil scanning. The HPGe measurement grid pattern will designed by the Characterization Lead and will be dependant on the scale of each area to be characterized. A Field Change Notice will be approved as per section 4.2 of this PSP to implement the measurement strategy. The configuration of the RSS (if used) will be equivalent to the RTRAK.

2.2 HPGe MEASUREMENTS (PHASE 2)

2.2.1 HPGe Measurements in Areas Exceeding 66 ppm

Where NaI system screening results indicate the soil exceeds a trigger level of 66 ppm for total uranium, the areas will be gridded into one (1) acre plots. A minimum of five (5) non-overlapping HPGe measurements will be taken in each one acre grid area. The measurement pattern is shown in Figure 2-1. The Characterization Lead may increase the measurement frequency, based on preliminary data results, via submittal of a Field Change Notice (FCN) in accordance with Section 4.2 of this PSP. One duplicate per every twenty (20) measurements shall be performed. Duplicate measurements will be performed at measurement point #1 in the grid.

HPGe detector system acquisition time will be set to 900 seconds. The detector height will be set at one (1) meter above ground surface.

Prior to HPGe measurements, the gridded areas and the measurement locations will be surveyed and marked as shown in Figure 2-1. Each HPGe measurement location will be identified as specified in Section 2.2.4.

2.2.2 HPGe Measurements in Areas Below 66 ppm

Areas determined by NaI scan that do not exceed 66 ppm will be divided into one acre grids. A minimum of one (1) HPGe measurement will be taken in each acre. HPGe measurements will be taken in the center of each gridded acre. The Characterization Lead may increase the measurement frequency, based on preliminary data results, via submittal of a Field Change Notice (FCN) in accordance with Section 4.2 of this PSP. One duplicate per every twenty (20) measurements shall be performed.

HPGe detector system acquisition time will be set to 900 seconds. The detector height will be established at one (1) meter above ground surface.

Prior to HPGe measurements, the gridded areas and the measurement locations will be surveyed and marked as shown in Figure 2-1. Each HPGe measurement location will be identified as specified in Section 2.2.4.

2.2.3 HPGe Measurements in Areas Exceeding 800 ppm

In areas exceeding NaI measurement values of 800 ppm total uranium, HPGe measurements will be taken using a detector height and grid measurement strategy designed by the Characterization Lead. The basis of the measurement strategy will be dependant on the scale of each area exceeding 800 ppm total uranium to be characterized. A Field Change Notice will be approved as per section 4.2 of this PSP to implement the measurement strategy.

Prior to HPGe measurements, the measurement locations determined by the Characterization Lead will be surveyed and marked. Each HPGe measurement location will be identified as specified in Section 2.2.4. One duplicate per every twenty (20) measurements shall be performed.

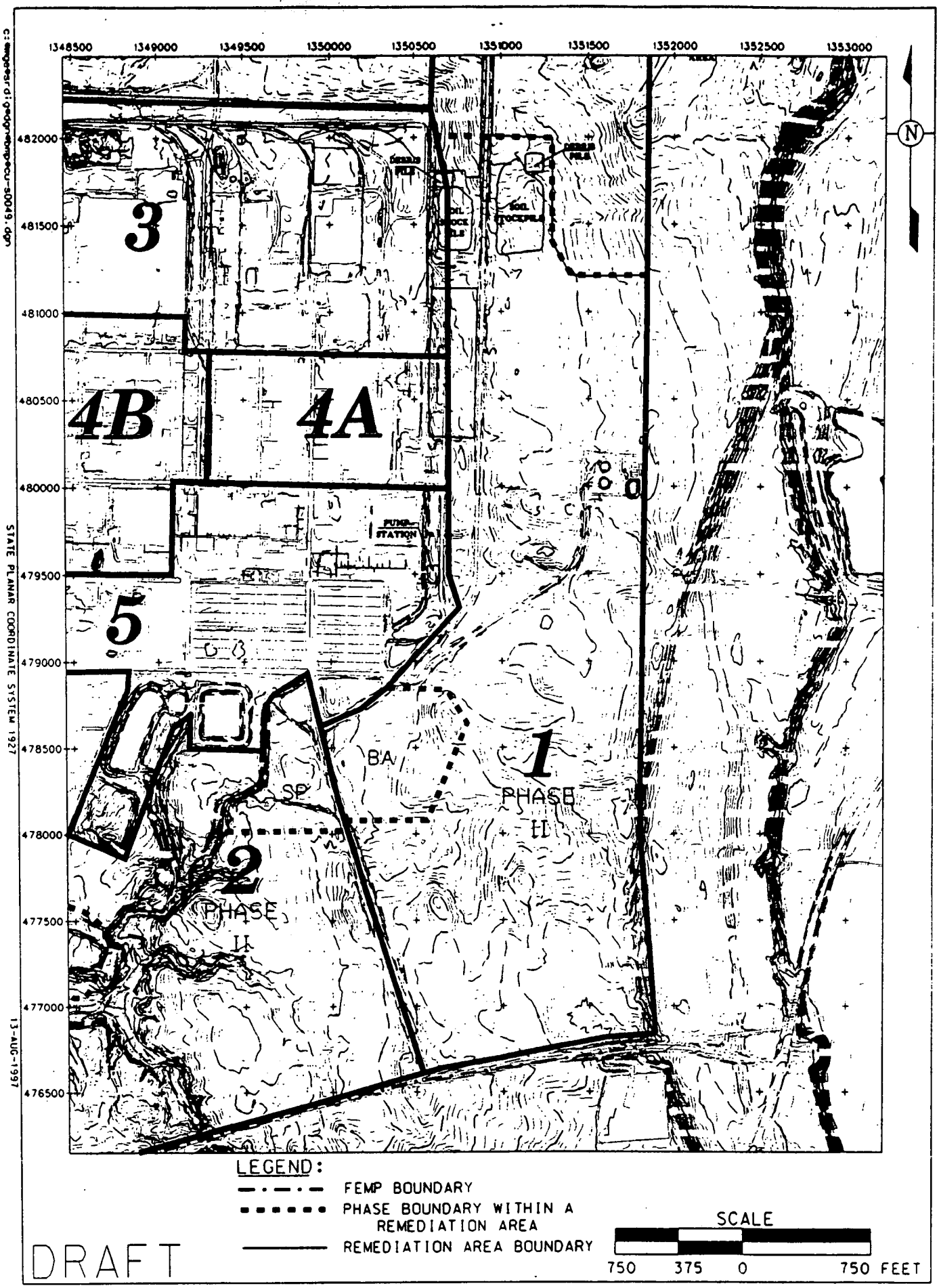


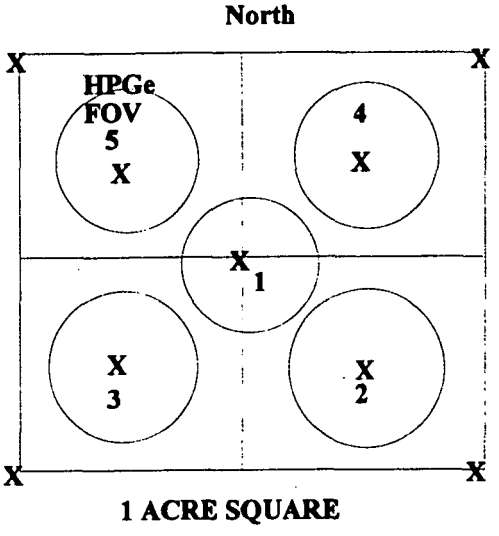
FIGURE 1-1. AREA 1 PHASE II

2.2.4 HPGe Measurement Identification

The HPGe measurement numbering format will be comprised of a prefix designating the area name (A1PII), followed by an area number (1 through x), followed by letters designating the purpose ("INV" for Investigative), followed by the sample number within in the area (1 through x), followed by a letter designating the type of sample ("G" for Gamma), followed by a letter indicating the quality assurance designation as applicable ("D" for duplicate).

Example: A1PII-INV-2-1-G-D is the duplicate gamma reading for the first measurement taken in the second one acre area identified in the A1PII investigation survey.

Figure 2-1 Measurement Pattern



X = Survey Point
# = Sample/Measurement Point Number

2.2.5 Surface Soil Moisture-Density Gauge Measurements

Surface moisture-density gauge measurements will be taken to determine soil moisture content and soil density. Measurements will be taken at each HPGe measurement point and at a minimum of 2 per acre of NaI scan area. The Characterization Lead may increase the number of moisture/density measurements taken based on the soil conditions at the time of the measurement. Measurements will be conducted in conjunction with HPGe and NaI measurements as close as practical in time but not simultaneously. This is to obtain results under the same environmental conditions but to prevent interference with the HPGe or NaI measurement from the internal radioactive sources contained in the moisture/density gauge. If surface soil conditions are unsuitable for moisture/density gauge measurements, a moisture core will be collected and submitted to the on-site laboratory for moisture analysis.

2.3 PHYSICAL SOIL SAMPLING (PHASE 3)

2.3.1 Sample Collection

Surface samples:

Physical sampling will be used to verify HPGe measurements. Physical samples will be taken from the 0 - 6" soil interval at a frequency of one (1) for every two (2) HPGe measurements in areas below the 66 ppm trigger level. In areas greater than 66 ppm including areas greater than 800 ppm the sampling frequency will be one for every HPGe measurement. These samples will be analyzed at the onsite laboratory for total uranium by Bromo-PADAP or ICP-MS to ASL B. Quality control samples will be taken and analyzed by Alpha Spectroscopy to ASL D by both on-site and off-site laboratories. Table 2-1 describes the analytical requirements for the physical sample analyses.

Samples will be collected using a 1 to 2-inch diameter plastic or stainless steel liner only using a manual hand auger. All surface vegetation within a six-inch radius of the sampling point shall be removed using a stainless steel trowel or gloved hand, minimizing the removal of any soil. The sampler shall be pushed to a depth of six-inches (0-6") for all sample points.

Subsurface samples:

If the results of any six-inch sample contains uranium greater than the FRL a subsurface sample boring will be collected using the geo-probe or manual hand auger to an additional depth of three feet at the node exhibiting the highest uranium concentration within each grid. This boring will be divided into three six (6) inch samples at one (1) foot intervals, (12"-18", 24"-30", and 36"-42"). If the deepest sample contains contamination above the uranium FRL, the boring will be extended an additional 3 feet to obtain 3 additional samples using the same protocol. Sampling will continue until the depth of excavation at the location of the deepest sample with uranium contamination is less than the FRL. All samples minus duplicate/split samples will be analyzed by Bromo PADAP or ICP-MS by the on-site laboratory and reported to ASL B. These samples are not subject to validation.

QC samples:

Duplicate samples will be collected for both surface and subsurface samples at a frequency of 1 in 10. The samples will be homogenized and split in the field. The duplicate samples will be mixed prior to splitting. One split will submitted to the on-site laboratory for total uranium by Alpha Spectroscopy analysis and reported at ASL D. The other split will be submitted to an off-site laboratory for total uranium by Alpha Spectroscopy and reported at ASL D. The samples going to the on-site laboratory get a "D" code, for duplicate, in the sample identification. In addition, one rinsate sample will be collected from the auger or cutting shoe (dependant on boring method) at a frequency of 1 in 20 augers or shoes that are decontaminated. For ASL D samples rinsate will be submitted to the on-site laboratory for total uranium by Alpha Spectroscopy at ASL D. All method detection limits must be below 20 ppm total uranium. Rinsates shall be identified by an "X" designator in the sample identification number.

Boreholes less than 4 feet deep will be plugged using bentonite pellets and hydrated using deionized water. Boreholes greater than 4 feet deep will be plugged using a volclay or similar grout injected by pum into the borehole. Boreholes will be plugged immediately after samples are been collected.

Table 2-1
Analytical Requirements for A1PII Pre-design Investigation

Analyte	Sample Matrix	Sample Type	Method	Lab	ASL	TAL	Holding Time	Container
Total Uranium	Solid	Grab	Bromo-PADAP/ ICP-MS	On-Site	B	A1PI I-DC-A	6 Months	500 ml glass or plastic
or								
Total Uranium	Solid	Grab	Alpha Spec	On-site & Off-Site	D	A1PI I-DC-B	6 Months	500 mL glass or plastic
10% of samples will be analyzed off-site at ASL D Note: No preservatives required								

Table 2-2

TARGET ANALYTE LIST
Area 1 Phase II Pre-design Investigation Sampling
Project Number 50.03.59.06

TAL A1PII-INV-A

Bromo PADAP/ICP-MS	
ASL B	Total Uranium

FEMP On-site Lab Analysis

Table 2-3

TARGET ANALYTE LIST
Area 1 Phase II Pre-design Investigation Sampling
Project Number 50.03.59.06

TAL A1PII-INV-B

Alpha Spec	
ASL D	Total Uranium

Split Samples - Off-site & On-site Lab Analysis
100% of ASL D samples for validation

2.3.2 Physical Sample Identification

All physical soil samples collected for laboratory analysis will be assigned a unique sample identifier divided into up to 20 characters separated by hyphens.

The numbering format will be comprised of a unique prefix designating the area name ("A1PII"), followed by a letter designating the sample type ("INV" for Investigation), followed by an area number (1 through x), followed by the sample number within in the area (1 through x), followed by the depth of the sample for subsurface samples ("1" for one foot deep, "2" for two foot deep, or "3" for three feet deep, etc.), followed by a letter indicating the analytical suite ("R" for radiological), followed by a letter indicating quality assurance designation as applicable ("D" for duplicate). The "D" designator will be assigned to the split sample going to the on-site laboratory. Rinsate samples will be designated by an "X".

Example: A1PII-INV-2-1-3-R-D is the sample number for the first radiological physical sample taken in the second area identified in the A1PII investigation at a depth of three feet and is a duplicate.

2.4 SURVEYING

State planar coordinates (NAD 83, Ohio South-3402) will be recorded for all RTRAK measurements. State planer coordinates and mean sea level elevations will be recorded for all HPGe measurement and physical sample locations. These locations will be identified using standard land surveying and measurement techniques. Delineation areas will be identified by markers at the perimeter of the area(s) using the identification protocol outlined in section 2.2.4.

3.0 LABORATORY SAMPLE PREPARATION

Samples submitted for analysis will be analyzed for total uranium. Sample preparation will include drying and grinding the samples, and the data will be reported on a dry weight basis. Percent moisture data will also be reported. The minimum detectable concentration (MDC) will be set at 2.0 ppm, with the highest allowable MDC at 20 ppm.

Sample analysis will be performed by either the Bromo-PADAP or ICP-MS methods for all ASL B samples. For the Bromo-PADAP method the analysis will be performed in accordance with procedure 256-S-6039, The Calorimetric (Br PADAP) Determination of Uranium Using an Autoanalyzer. For analysis performed by ICP-MS the analysis shall be performed in accordance with methods C97-013 and C97-305, Total Uranium by ICP-MS.

4.0 QUALITY ASSURANCE/QUALITY CONTROL REQUIREMENTS

4.1 PROJECT REQUIREMENTS FOR SURVEILLANCES

Project management has the ultimate responsibility for the quality of the work processes and the results of the sampling activities covered by this PSP. The Soil and Water Projects QA will conduct independent assessments of the work process and operations to assure the quality of performance. Assessment will encompass technical and procedural requirements of this PSP and the SCQ. Independent assessment will be performed by conducting surveillances. At a minimum, one surveillance will be conducted during implementation of this PSP, consisting of monitoring/observing on-going project activity and work areas to verify conformance to specified requirements. Surveillances will be planned and documented according to Section 12.3 of the SCQ. The QA representative will be apprised of the scanning and sampling schedule before field work begins.

Operation and calibration of NaI and HPGe detectors will be consistent with methods employed during data collection discussed in *Comparability of In-Situ Gamma Spectrometry and Laboratory Data*, 20701-RP-0001, Rev 0, July 1997, and the *RTRAK Applicability Study*, 20701-RP-003, Rev 0, July 1997.

4.2 IMPLEMENTATION OF FIELD CHANGES

If field conditions require changes or variances, the A1PII Characterization Lead must obtain verbal approval (electronic mail is acceptable) from the A1PII Project Manager, the Characterization and Sampling Manager, and QA before the changes may be implemented. Changes to the PSP will be noted in the applicable field activity logs and on a Variance/Field Change Notice (V/FCN). QA must receive the completed V/FCN, which includes the signatures of the Project Sampling Lead, Project Lead, and the QA Representative, within 7 working days of the granting of the verbal approval.

Sample locations can be moved up to three feet in the field without submittal of V/FCN or re-surveying provided the direction and distance moved are indicated on the Field Activity Log (FAL). Examples of reasons why the location can be moved include buried obstructions (i.e., boulders or utilities) or to avoid adverse surface conditions such as standing water. A V/FCN and re-survey will be necessary for sample locations moved more than three feet.

5.0 EQUIPMENT DECONTAMINATION

Sampling equipment will be decontaminated before transport to the field sampling site, and after all sampling is completed. The decontamination of equipment that comes into contact with the sample (i.e., the core cutting shoe, if used) will be a Level II decontamination as referenced in the SCQ. The core barrel portion of the sampler will be wiped down between sampling locations to remove visible soil or material (Level I decon). Decontamination of the core barrel between sample locations will not be necessary since it will not come into contact with the sample when using a liner insert.

Any hand tools used to process the soil samples will be decontaminated between sample intervals and locations. If a hand auger is used, it will be decontaminated between sample locations. New, clean plastic will be laid down for each individual soil core.

6.0 HEALTH AND SAFETY

Field Personnel shall conform to precautionary surveys performed by the personnel representing the Utility Engineer, Occupational Safety, Radiological Control, and Industrial Hygiene.

All work on this project will be performed in accordance with applicable Environmental Monitoring Project Procedures, RM-0021 - Safety Performance Requirements Manual, FDF Work Permit, RWP, Penetration Permits, and other applicable permits. Concurrence with all applicable safety permits is required by sampling technicians in the performance of their assigned duties.

The Characterization and Sampling Manageror the Health and Safety contact will ensure that each team member performing sampling related to this project has been trained to all applicable health and safety requirements for the A1PII specific work area. Technicians who do not receive a briefing on these requirements will not participate in the execution of sampling activities related to the completion of assigned project responsibilities. A copy of applicable penetration and safety permits/surveys/RWPs issued for worker safety and health shall be posted at each sample location area; and at the completion of the project, the completed forms shall be submitted for incorporation into the project record files.

7.0 WASTE DISPOSITION

During sampling activities, field personnel may generate small amounts of soil, water, and contact waste. Management of these waste streams will be coordinated with SCEP Waste Disposition Support Services (WDSS) through the Project Waste Identification Document (PWID) process. Generation of decontamination waters will be minimized in the field, and whenever possible, equipment will be decontaminated at a facility that discharges to the Advanced Wastewater Treatment (AWWT) facility, either directly or indirectly through the stormwater collection system. Contact waste generation will be minimized by limiting contact with sample media, and by only using disposable materials which are necessary. This waste stream will be evaluated against dumpster criteria during the PWID process. If it does not meet these criteria, an alternative disposition will be identified.

8.0 DATA MANAGEMENT

As specified in Section 5.1 of the SCQ, sampling teams will describe daily activities on the Field Activity Log sufficient for the sampling team to reconstruct a particular situation without reliance on memory. Sample Collection Logs will be completed according to instructions specified in the SCQ.

Field documentation, such as the Field Activity Logs, Gamma Spectrometry Field Worksheets, Survey Files, Nuclear Field Density/Moisture Worksheets, and the Sample Collection Log will undergo an internal QA/QC review by the technicians. Copies will then be generated and will be delivered to the Characterization Manager and the Data Management Contact. The Data Management Contact will perform an evaluation of the data and create the appropriate links between the electronically-recorded data and the paper-generated data. From this point, the paper-generated data will be sent to data entry personnel for input into the Oracle System. Field logs may be completed in the field and maintained in loose-leaf form. Loose leaf pages will be numbered. All data recordings will be in ink. Physical sampling field documentation will be reviewed by QA validation.

Analytical data from on-site and off-site laboratories will be reported in preliminary form to the Project Manager by the Laboratory Contact when the data is available in the FACTS database. Following validation of the data for each sample release, the data for that release will be reported to the Characterization Manager in the final data report format.

9.0 APPLICABLE PROCEDURES AND STANDARD METHODS

Sample collection under this PSP shall follow the requirements outlined within the following procedures and standard methods:

ADM-02, Field Projects Prerequisites

EQT-05, *Geodimeter 4000 Surveying System - Operation, Maintenance and Calibration*

EQT-06, Geoprobe® Model 5400 Operation and Maintenance Manual

EQT-22, *Characterization Of Gamma Sensitive Detectors.*

EQT-23, *Operation of ADCAM Series Analyzers With Gamma Sensitive Detectors.*

EQT-30, *Operation of Radiation Tracking Vehicle Sodium Iodide Detection System.*

EQT-32 *Troxler 3440 Series Surface Moisture/Density Gauge - Calibration, Operation, and Maintenance.*

SMPL-01, *Solids Sampling*

SMPL-21, *Collection of Field Quality Control Samples*

256-S-6039, The Calorimetric (Br PADAP) Determination of Uranium Using an Autoanalyzer

C97-013 and C97-305, Total Uranium by ICP-MS

Trimble® Pathfinder Pro-XL GPS Operation Manual

RTRAK Applicability Study, 20701-RP-003, Rev 0, July 1997.

Comparability of In-Situ Gamma Spectrometry and Laboratory Data, 20701-RP-0001, Rev 0, July.1997

Sitewide Excavation Plan, 2500-WP-0028 Rev.C Draft

Sitewide CERCLA Quality Assurance Plan (SCQ)

10.0 DATA QUALITY OBJECTIVES

The following DQO(s) support sampling activities contained in this plan:

SL-047 Real Time Monitoring for Pre-design, Pre-certification and Certification

Uncontrolled copies of these DQOs are contained in Appendix A.

APPENDIX A

Control Number _____

Fernald Environmental Management Project

Data Quality Objectives

Title: Real Time Monitoring for Predesign, Precertification, and Certification for Total Uranium

Number: SL-047

Revision: 0

Date: 8/27/97

Contact Name: Dale Seiller

Approval: Frank Thompson for William D. Kelley — **Date:** 8-27-97
DO Coordinator

Approval: Joan White — **Date:** 8-27-97
Joan White
Characterization and Sampling Manager

Rev. #	0						
Date:	8/27/97 JTW						

Data Quality Objectives
Real Time Monitoring for Predesign, Precertification, and Certification

1.0 Statement of Problem

Conceptual Model of the Site

Contamination is defined as an average soil concentration of an area-specific constituent of concern (ASCOC) greater than the final remediation level (FRL). Additionally, soil can be identified as exceeding the waste acceptance criteria (WAC). The source of contamination in peripheral or boundary areas is primarily from airborne deposition from the former production area of the FEMP. The extent of soil contamination was estimated and published in the Operable Unit 5 Feasibility Study (FS). These estimates were based on kriging analysis of available uranium data for soil collected during the Remedial Investigation (RI) effort and from other environmental studies conducted at the FEMP. Maps outlining contaminated soil boundaries were generated for the Operable Unit 5 FS by overlaying the results of the kriging analysis of uranium data with isoconcentration maps of the other constituents of concern (COCs) as presented in the Operable Unit 5 RI report, then comparing this with spatial maps of recently acquired data.

Real time monitoring using mobile sodium iodide (NaI) systems mounted on tractors (RTRAK), smaller pushable NaI units (R.S.), and stationary germanium detectors (HPGe), can significantly accelerate the pace of necessary additional characterization.

Exposure to Soils

The cleanup standards, or FRLs, were developed for a final site land use as an undeveloped park. Under this exposure scenario, receptors will be exposed to contaminated soils through direct radiation, dermal contact, incidental ingestion, and inhalation of fugitive dust of both radiological and non-radiological COCs.

Available Resources

Time: Predesign and precertification for areas scheduled for remediation must be accomplished by the field team of samplers and real-time instrumentation operators to provide the required information in a timely manner to support the certification effort.

Project Constraints: FEMP remediation activities are being performed in support of the Accelerated Remediation Plan. Predesign, and precertification real time monitoring, sampling and analytical testing must be performed with existing manpower and instrumentation, considering instrument availability, to support the remediation and certification schedule. Remediation, certification, and regrading of the site to meet final land use commitments is dependent on successful completion of this work.

2.0 Identify the Decision

Decision

Three decision processes will be reached as a result of predesign, precertification, and certification sampling and analytical testing. Those decision processes are as follows:

1. Identify surface soil areas that exceed WAC for uranium to support their removal and off-site disposition prior to remediation.

2. Provide surface soil boundary excavation estimates prior to remediation by developing isoconcentration gradient maps of the primary constituents using data output from NaI detectors, strategic High Purity Germanium detector (HPGe) readings, and laboratory analysis of field samples as required.

3. Provide assurance that postremedial surface soils and unexcavated surface soil areas are prepared for certification by:

   - Identification of surface soils at 800 ppm uranium or above, which is a not to exceed level for the RTRAK read areas, for WAC. The 800 ppm represents the 95% confidence level for the NaI instrument identifying contamination in excess of the WAC 1030 ppm.

   - Identification of soils achieveing the target level of 66 ppm total uranium. This represents the 95% confidence level for the NaI instrument identifying contamination in exceeds of 82 ppm. The 82 ppm number represents the FRL for uranium in soil in most areas under post-remedial conditions.

   - Identification of heterogeneous surface soil contamination.

   - Collection of discrete surface soil samples and analytical

testing, where necessary, to confirm the real-time readings of radio nuclide concentrations in the surface soil.

Possible Results

1. One or more read areas are identified as exceeding 800 ppm uranium, and this area is further delineated and removed prior to certification.

2. Soil exceeds the WAC and must be defined and excavated to a defined threshold limit of confidence and stored for eventual off-site disposition.

3. Soil does not exceed the WAC threshold but is contaminated above the FRL. Soil identified as such must then be integrated into remediation plans for excavation, stockpiling, and eventual disposal in the OSDF.

4. If the trigger level of 66 ppm total uranium is not exceeded, then the area is considered prepared for certification testing.

3.0 Identify Inputs That Affect the Decision

Required Informational Input

Estimates of surface soil uranium concentration and estimates of the variation in surface soil uranium contamination in areas undergoing remediation will be obtained from predesign and precertification analytical data.

Source of Informational Input

Predesign and precertification measurements for gamma discernible radiological COCs will involve readings from mobile and stationary in-situ equipment with additional physical sampling for verification of real time measurements.

Action Levels

The FRL for most areas is uranium is 82 ppm. The FRLs was developed to account for health risks, cross media impact, background concentrations, and applicable or relevant and appropriate requirements (ARARs) and represent not-to-be exceeded contaminant-specific average soil concentrations. The On-site Disposal Cell (OSDF) WAC criteria is 1030 ppm. These action levels are published in the Operable Unit 5 Record of Decision (OU5 ROD).

Based on these action levels, trigger levels for the NaI instrument were developed based on several factors including: RTRAK speed and acquisition time, data reduction, and measurement radii. In order to meet a 95% confidence level for the

NaI instrument to identify contamination in exceeds of 82 ppm, the trigger level is 66 ppm. Based on these same considerations the trigger level for the WAC of 1030 ppm was set at 800 ppm.

Real time HPGe readings may be taken to support excavation to ALARA requirements.

Physical samples will be taken to verify HPGe readings and determine whether action levels for FRLs and WAC are met.

Methods of Data Collection

Mobile NaI RTRAK and RSS systems will be utilized for complete semiquantitative coverage of the areas of concern, and additional quantitative information will be obtained from strategic stationary readings from HPGe systems. Analysis and data management for the NaI and HPGe systems will be conducted at ASL B and performed according to applicable site procedures. The RTRAK and RSS will be utilized to establish general radiological concentration isolines and detect hot spots. The HPGe gamma detectors will be used when more refined supporting quantitative resolution is required. Daily source checks will be conducted as directed in the systems' operational procedure. Sample data will be reviewed at least daily by Field Supervisor for the sampling.

Surface physical samples will be collected to verify HPGe readings in confirming action levels for FRL and WAC attainment. Additional physical samples may be identified in PSPs to verify HPGe readings below FRL levels, in predesign or pre certification and will be required for certification confirmation.

4.0 The Boundaries of the Situation

Spatial Boundaries

Domain of the Decision: The boundaries limited to surface soils in the designated areas and adjacent areas as designated in the individual work plans.

Population of Soils: The soils affected are surface soils (to a nominal depth of 6 inches), which include freshly excavated surfaces and undisturbed soils associated with excavation areas as designated in the individual work plans.

Temporal Boundaries

Time frame: Investigations must be conducted both before and during initial excavation, and analytical results must be returned in time for the information to be useful within the current remediation schedule.

Time Constraints on Sampling: The scheduling of predesign and precertification sampling is closely associated with the excavation schedule. Sampling should be performed before and during excavation and before certification, while not interfering with or delaying planned construction work.

Practical Considerations: In-situ gamma spectrometry measurements cannot be made during snow coverage or standing water conditions or during precipitation. Field analytical methods should also be limited to unsaturated soils. Most areas of concern are flat open terrain and readily accessible. Some areas may require preparation, such as cutting of grass or removal of undergrowth, fencing and other obstacles. In situ measurements will require coordination with appropriate maintenance personnel for site preparation. Physical and environmental parameters will be recorded and assessed during data collection.

5.0 Develop a Logic Statement

Parameters of Interest

The surface soil concentration of uranium is the parameter of interest.

Predesign and Precertification Target Levels

The WAC threshold level of 800 ppm total uranium and the FRL threshold of 66 ppm will be used to determine biased HPGe measurement locations.

Decision Rules

If radiological contamination is identified by the RTRAK or RSS, the area will be subjected to more quantitative analysis using the HPGe system or a combination of the HPGe and physical samples as defined in the project-specific plan.

6.0 Establish Constraints on the Uncertainty of the Decision

Range of Parameter Limits

The range of soil concentrations anticipated will be from background (natural concentrations or zero depending on ASCOC), to greater than the maximum subsurface value indicated in the RI database.

Types of Decision Errors and Consequences - Predesign

Decision Error 1: This decision error occurs when too little a volume of soil is designated for excavation. This could result in an additional, costly phase of excavation during the precertification phase.

Decision Error 2: This decision error occurs when clean soil is designated for excavation. This would result in added costs due to the excavation of clean soils, increased volume in the OSDF or off-site facilities, or unnecessary construction of engineering controls. This is not as severe as Decision Error 1. The addition of clean soil to the OSDF would result in further reduction, although minimally, to human health risk in the remediated areas.

Decision Error 1 would be the more severe error.

Types of Decision Errors and Consequences - Precertification and Certification

Decision Error 1: This decision error occurs when the decision maker decides an area has been adequately prepared for certification when the average soil concentration in an area is still above the target level or WAC. If an area fails certification sampling and analytical testing, remobilization and further excavation, precertification, and certification sampling would be necessary.

Decision Error 2: This decision error occurs when the decision maker continues excavation or directs soils to the OSDF when they are actually below the FRLs, when he/she directs materials off-site if they are below the WAC, or when he/she directs that unnecessary engineering controls be built to prevent run on. This would result in added costs due to the excavation of clean soils, increased volume in the OSDF or off-site facilities, or unnecessary construction of engineering controls. This is not as severe as Decision Error 1. The addition of clean soil to the OSDF would result in further reduction, although minimally, to human health risk in the remediated areas.

Decision Error 1 would be the more severe error.

True State of Nature for the Decision Errors

The true state of nature for Decision Error 1 is that the actual concentration of ASCOCs are greater than their FRLs or WAC. The true state of nature for Decision Error 2 is that the true concentrations of ASCOCs are below their FRLs or WAC.

Null Hypothesis

H_o: Mean surface soil concentration in an area is greater than the action level.

H_1: Mean surface soil concentration in an area is less than or equal to the action level.

7.0 Optimize a Design for Obtaining Quality Data

Uranium data will be generated by three methods. Two methods will consist of the mobile sodium iodide (NaI) detection system currently mounted on the RTRAK or R.S. which will provide a semiquantitative activity of uranium, and the high purity germanium (HPGe) systems that will provide stationary readings and quantitative measurements. The NaI and HPGe systems will be employed during predesign, precertification, and certification activities.

Physical samples will be collected for HPGe data verification and FRL/WAC attainment decision making.

Sodium Iodide (NaI) System

Prior to excavation or certification the NaI systems currently mounted on the RTRAK or R.S. will be used to obtain measurements over an area in a PSP designated pattern to detect uranium levels above WAC and to detect hot spots. The NaI detector system(s) will be used at speeds and with count times as specified in the project-specific plan. The mobile systems will be electronically coupled with a global positioning system (GPS) rover and base unit to record the location of every reading. Counting and positioning information will be recorded continuously on a field personal computer (PC) and stored on disk or hard drive for future downloading on the site soil database and Graphical Information System (GIS) system. The HPGe will be used to achieve as close to 100 percent coverage as possible , taking into consideration topographic and vegetative constraints which limit access by NaI systems.

Information from the NaI/GPS system will be recorded on the PC and transferred to the Unix system through the local area network on a regular (at least daily) basis. The information will then be plotted on the FEMP GIS system and isolines and hot spots identified for review. The RTRAK system will provide complete coverage of the area. With the output, isolines of "relative" contamination can be developed and hot spot locations identified.

Data reduction is an important aspect of NaI system data use. For developing isolines and excavation footprints, after the data is taken, an artificial grid is placed over the field of data and GPS coordinate pairs. Averages are calculated at nodes (where gridlines cross) by combining all of the results within a radius of the node. The configuration of the grid and the radial distances from the nodes used in calculations depend on the data quality and intended use, and are specified in the project-specific plan.

NaI measurements will not be used for WAC decision making; NaI measurements will be supported by HPGe measurements and physical sampling. WAC decisions will be based on physical sample results.

In-Situ HPGe Detectors

The HPGe system(s) will be used in conjunction with the NaI system to quantify concentrations of uranium potentially in excess of WAC, target hot spots, and verify an area is ready for certification.

In area of topographic or vegetative constraints, the HPGe detectors may be used in place of the NaI systems. The HPGe grid used to cover the area may be of varying densities dependant upon the expected mode of contamination and the expected areal extent of contamination, based on RI/FS or process knowledge. The density of HPGe grids will be specified in the PSP.

Moisture and density readings will be taken using the Troxler moisture density gauge. If conditions do not permit the use of the Troxler, soil samples will be collected and measured for moisture only.

Radiological Soil Sampling

Physical samples can be collected and analyzed for total uranium to verify HPGe measurements. Criteria for obtaining physical samples, such as sample density, will be specified in the project-specific plan directing collection of sufficient samples of appropriate data quality to satisfy the decision criteria. The minimum data quality acceptable for this purpose will be ASL B. Archiving of samples may be necessary.

One duplicate QC sample per 10 physical samples will be collected and analyzed and validated to ASL D. The QC sample will be homogenized and split, one half going for off site analysis and the other half remaining on site for analysis at the on site laboratory.

Rinsates will not be collected for ASL B samples, since the use of sealed container sleeves to double as shipping containers eliminates the possibility of air-borne deposition. If an alternate method of sample collection is identified in the PSP, rinsate requirements will be specified in the PSP. Rinsates will be collected for ASL D samples.

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Data Quality Objectives
Uranium Precertification and Waste Acceptance Criteria Sampling

1A Task/Description: Predesign, precertification and certification data collection.B. Project Phase: (Put an X in the appropriate selection.)

RI ☐ FS ☐ RD ☐ RA ☒ R,A ☐ OTHER ☐

1.C. DO No.: SL-047 DQO Reference No.: SL-024, SL-028

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2. Media Characterization: (Put an X in the appropriate selection.)

Air ☐ Biological ☐ Groundwater ☐ Sediment ☐ Soil ☒

Waste ☐ Wastewater ☐ Surface water ☐ Other (specify) _____

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3. Data Use with Analytical Support Level (A-E): (Put an X in the appropriate Analytical Support Level selection(s) beside each applicable Data Use.)

Site Characterization A ☐ B ☒ C ☐ D ☒ E ☐	Risk Assessment A ☐ B ☐ C ☐ D ☐ E ☐
Evaluation of Alternatives A ☐ B ☐ C ☐ D ☐ E ☐	Engineering Design A ☐ B ☒ C ☐ D ☒ E ☐
Monitoring during remediation activities A ☐ B ☒ C ☐ D ☒ E ☐	Other -Precert and certification A ☐ B ☒ C ☐ D ☒ E ☐

4.A. Drivers: Area 1 Phase 2 Predesign Investigation Survey Project-Specific Plan, Applicable or Relevant and Appropriate Requiremnts (ARARs) and Operable Unit 5 Record of Decision (ROD)

4.B. Objective: To verify excavation design prior to remediation or confirm that excavation activities have remediated the site to below the target level for total uranium.

5. Site Information (Description): The OU2 and OU5 RODs have identified areas at the FEMP that require remediation activities. The RODs specify that the soils in these areas will be clean and demonstrated to be below the FRLs. Predesign and precertification will be necessary for areas of the site with soils that are scheduled for certification, areas that are scheduled for remediation or excavation, and placement in the OSDF; areas that have been excavated; and adjacent areas which could affect the remediated or excavated site.

6.A. Data Types with appropriate Analytical Support Level Equipment Selection and SCQ Reference: (Place an "X" to the right of the appropriate box or boxes selecting the type of analysis or analyses required. Then select the type of equipment to perform the analysis if appropriate. Please include a reference to the SCQ Section.)

1.	pH	☐	2.	Uranium	☒	3. BTX	☐
	Temperature	☐		Full Rad.	☐	TPH	☐
	Spec.Conductance	☐		Metals	☐	Oil/Grease	☐
	Dissolved Oxygen	☐		Cyanide	☐		
	Technitium-99	☐		Silica	☐		
4.	Cations	☐	5.	VOA	☐	6. Other (specify)	
	Anions	☐		ABN	☐		
	TOC	☐		Pesticides	☐		
	TCLP	☐		PCB	☐		
	CEC	☐					
	COD	☐					

6.B. Equipment Selection and SCQ Reference:

Equipment Selection		Refer to SCQ Section	
ASL A	_____	SCQ Section:	_____
ASL B	Nal Detector*, HPGe Detector* Physical samples	SCQ Section:	APP. G , Table 1
ASL C	_____	SCQ Section:	_____

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ASL D Physical samples SCQ Section: APP. G, Table 1

ASL E _____ SCQ Section: _____

* NaI and HPGe are not yet in the SCQ. SCQ Reference refers to confirmatory physical sampling and analysis.

7.A. Sampling Methods: (Put an X in the appropriate selection.)

Biased ☒ Composite ☐ Environmental ☐ Grab ☒ Grid ☒

Intrusive ☒ Non-Intrusive ☒ Phased ☐ Source ☐

7.B. Sample Work Plan Reference: The DQO is being established prior to completion of the work plan.

Background samples: OU5 RI/FS

7.C. Sample Collection Reference:

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8. Quality Control Samples: (Place an "X" in the appropriate selection box.)

8.A. Field Quality Control Samples:

Trip Blanks	☐	Container Blanks	☐
Field Blanks	☐**	Duplicate Samples	☒
Equipment Rinsate Samples	☐***	Split Samples	☐
Preservative Blanks	☐	Performance Evaluation Samples	☐

Other (specify) _____

** Traditional field blanks will not be collected. The use of sealed container sleeves to double as shipping containers eliminates the possibility of air-borne deposition.

*** Rinsates, if applicable, will be specified in the project-specific plan.

8.B. Laboratory Quality Control Samples:

Method Blank	☒	Matrix Duplicate/Replicate	☐
Matrix Spike	☒	Surrogate Spikes	☐

Other (specify) _____

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9. Other: Please provide any other germane information that may impact the data quality or gathering of this particular objective, task or data use.